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ABSTRACT

Non-conserver children have been shown to progress in a spatial transformation task if the material is socially marked, i.e., when there is a correspondence between the cognitive relations and some social relation (Doise and Mugny, 1981). The present experiment was designed to assess the efficacy of social marking when the social necessity of conserving relationships is not directly expressed in the material. Also studied was the issue of whether the functional marking of display produces the effects associated with social marking. A total of 280 kindergarten and first grade children were pretested in a task that required a complex transformation to preserve the relation between elements in a spatial array. Then, 82 non-conserver subjects were assigned to one of four conditions: (1) social marking of material; (2) social marking without any expressed social relation; (3) functional marking; and (4) control condition. In the test phase, the two socially marked conditions yielded performances superior to those in the others, with performance in the functionally marked condition superior to that in the control condition. In the post-test phase, significant progress was observed in both of the socially marked conditions, while only marginal progress was found for the other conditions. (Author/RH)

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SOCIAL AND FUNCTIONAL MARKING IN SPATIAL TRANSFORMATION TASK (MARQUAGE SOCIAL ET MARQUAGE FONCTIONNEL DANS UN'EPREUVE DE TRANSFORMATION SPATIALE)

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Paper presented at ISSBD Eighth Biennal Meeeting (Université F. Rabelais, Tours, France, July 1985). The authors wish to express their appreciation to Roberta Cecotti for her help with the data collection and to the principal and teachers of Materna di Via dell'Orna (Padova) school. Authors' address: Dipartimento di Psicologia dello Sviluppo e della Socializzazione, Università di Padova, Via B. Pellegrino 26, 35137, Padova.

It has been shown (Doise and Mugny, 1981) that in a task of spatial transformation non conserver children can progress if the material is socially marked, i.e. when there is a correspondence between the cognitive relations and some social relation. The present experiment was designed to assess the efficacy of social marking when the social necessity of conserving relationships is not directly expressed in the material. Further, we studied whether the functional marking of display produces the same effects of social marking. 280 children (kindergarten and first grade) were pretested in a task that required a complex transformation to preserve the relation between elements in a spatial array. 82 non-conserver Ss were assigned to one of four condition: a) social marking of material, b) social marking without any expressed social relation, c) functional marking, d) control condition. In the test phase the two socially marked conditions yielded performances superior to those in the other one, with performances in the functionally marked condition also superior to that in the control condition. In post-test phase significant progress were observed in both the socially marked conditions,while only marginal progress was found for the other conditions.

Introduction

The concept of social marking, arising within the ambit of researches on genetic social psychology (Doise and Mugny, 1981), deals with corrispondence between the responses that a S may produce on the basis of social knowledge about an experimental situation, and the responses that the same S may produce on the basis of cognitive ability. When this corrispondence is made pertinent, so that the S may compare the two response systems, the deriving conflicts lead to restructuring of the S's cognitive capacities.

It has been shown (Rilliet, quoted in Doise and Mugny, 1981; De Paolis, 1982) that a situation without social interaction may also be socially marked. The task used in the above works modified the Piagetian paradigm of the three mountains (Piaget and Inhelder, 1948). Ss were required to reconstruct a village (unmarked material) or a classroom (marked material). The results showed that in the latter case Ss' performances were better, and this difference was shown to be due to the necessity, only present in marked material, to respect socially regulated spatial arrangements- those between teacher and pupils.

Alternative interpretations of these data are possible if the marked situation are defined as familiar and/or equipped with a social sense (sensu Donaldson, 1978). However, De Paolis (1982) has also shown that situations in which the space to be reconstructed is familiar and those in which the elements in the space to be reconstrucied contain a specific orientation, do not bring about the same improvements as marked situations do.

Research

The aim of the present researche was twofold:

1) To establish whether the effects of social marking may also be obtained in situations in which the social rules determining spatial subdivision are not represented by social actors. For this aim, we compared the marked condition of the classroom with a condition in which Ss were asked to transform the inside of a car. In this second case, no social characters were presented concretly, although the material implied reference to a real situation in which the space was subdivided on the basis of a rigid social hierarchy (adults, parents vs children);

2) To establish whether the effects attributed to social marking could be determined by the presence, in the material to be reconstructed, of a non-random orientation of elements. However, differently form the situation used by De Paolis (1982), orientation had to be directly linked to spatial arrangements. A third situation was thus constructed, in which Ss were asked to reconstruct a road with cars stationary at a red light? In this way, was possible to check whether the non-random and uniform orientaion (all the cars were stationary at the light and were all going in the same direction) was sufficient to cause cognitive progress.

Briefly, the experimental design involved three phases, each separated by one week:

1) Pretest (unmarked material of a village) for selection of incorrect Ss;
2) Test, with four experimental conditions: two marked, one really (classroom) and one symbolically (car); two unmarked, one with functional orientation only (road), the other without (village);
3) Post-test (unmarked material) for verifying possible progress.

Method

Subjects

313 Ss were pretested, ranging in age from 4.9 to 6.9 years.

Procedure

The pretest was based on the conservation of spatial relations (Mugny and Doise, 1978). It was composed of a model village constructed by the experimenter on a base de'icting a refernce mark; the child was required to reconstruct the same village on an identical but differently-oriented base (see Fig. 1) The pretest was composed of a simple item which, for correct reconstruction required the ensemble to be rotated by 90°, and two complex items, on which the S had to perform a transformation by inverting the left/right and front/behind relations.

The post-test used a complex item with five houses, more difficult to solve than the complex items of the pretest because of the multiple intersections of the two dimensions (left/right and front/behind).

The experimental phase only included Ss (in all 82) who, on both complex items of the pretest, produced lower-level responses, i.e. solutions which translated the ensemble of the village, and /or took into account the 90° rotation of the support but not of the relation between the marks (Ss NC= no compensation). Ss who totally compensated the rotation (Ss TC= total compensation) and those who partially compensated for changes in orientation (Ss PC= partial compensation) were excluded form the experimental phase.

In the test phase Ss were placed in a difficult position (D), from which the task was complex (see Fig. 2). They were required to construct, on the copy base, a replica of the display proposed by the experimenter on the model base. The displays were different for each of the four groups.

Group 1: reconstruct a classroom with pupils (elements) and teacher (mark).

Group 2: reconstruct the inside of a car withg seat (elements) and steering-wheel.

Group 3: reconstruct a road with cars (elements) and traffic-lights (mark).

Group 4: reconstruct a village with houses (elments) and swimming-pool (mark).

Measures

In the test phase results were evaluated both as mean number of houses placed and orientated correclty, as well as general strategy of solution (see Tables 1 and 2). in the post-test phase, because of the low number of elements, only general strategy measures were analyzed

(see Table 3).

Results

Table 1 presents the mean number (out of a maximum of 16 per cell) of correct placements with correct orientation of the elements and correct orientation only, in the test phase.

TABLE 1

Mean number (max= 16 per cell) of correct collocations and correct orientations (a) , and correct orientation (b) of elements in Ss' copy on test phase

Condition/Performance	(a)	(b)
1 Classroom	11.5	14.8
2 Car	11.5	15.9
3 Road	9.6	13.0
4 Village	5.4	8.1

N. Ss= 19 in condition 1, 21 in the other

Collocation and orientation score.

One-way (condition) ANOVA for unequal sample sizes: $F(1,78)= 5.1$, $P < .003$

Newman-Keuls post-hoc analyses: (condition 1 = condition 2) > condition 3 > condition 4 (all $p < .01$).

The data indicated that in the two socially marked conditions (1 and 2) the Ss performed better than in the two non-socially marked conditions (3 and 4). In the road condition (3) performance was better than in the control condition (4).

Orientation scores.

One-way (condition) ANOVA for unequal sample sizes: $F(1,78)= 11$, $p < .001$

Newman-keuls post-hoc analyses: (condition 1 < condition 2) > condition 3 > condition 4.

In both marked conditions (1 and 2), a higher number of correct orientations was found with respect to the other two conditions (3 and 4), but there was also a differntiation within the two main groups: performance on the car condition (2) was almost perfect and better than on the classroom condition (1); performance on the road condition (3) was better than that of the control group (4).

Table 2 shows the frequency of progressed Ss (those using PC and/or TC strategies) and non-progressed Ss in the test phase. The results of a Jonckheere test were similar to those obtained using parametric analysis: conditions (1=2) >3 >4.

TABLE 2

Frequency of progressed and non-progressed Ss from the pretest to the test in the four condition

Condition/Ss	Progressed	Non-progressed	Total
1 Class	19	0	20
2 Car	20	1	21
3 Road	17	4	21
4 Village	11	10	21

N. Ss with PC and/or TC strategies in al least 2 items were considered progressed

Jonckheere test: condition 1 vs 3, $z = 2.07$, $p < .02$
1 vs 4, $z = 3.59$, $p < .002$
2 vs 3, $z = 1.88$, $p < .03$
2 vs 4, $z = 3.50$, $p < .001$
3 vs 4, $z = 2.26$, $p < .01$

Table 3 shows the frequency of the three types of general strategy in the solution of the 5-elements task on the post-test. In this case too, the Ss in the two marked groups (1 and 2) produced a significantly higher number or more eleborate strategies.

TABLE 3

Frequency of the three types of general strategy in 5-element task solution on the post-test in the four conditions.

Condition/Strategy	NC	PC	TC	Total
1 Classroom	11	4	3	18
2 Car	9	7	2	18
3 Road	16	2	1	19
4 Village	18	0	2	20

N. With respect to the test, 7 Ss were absent on the post-test.

Jonckheere test: conditions 1 vs 3, $z = 1.80$, $p < .03$
1 vs 4, $z = 2.31$, $p < .01$
2 vs 3, $z = 2.27$, $p < .01$
2 vs 4, $z = 2.74$, $p < .003$

Discussion

The test data showed that:
1) on spatial tasks, the increased understanding produced by social marking does not depend on the presence in the material of elements representing specific social roles;
2) both conditions with social marking turned out to be performed better than the unmarked conditions, particularly that with functional orientation of elements (road). However, the latter turned out to be performed better than the control condition (village), showing that specification of orientation between elements and mark is a factor that, at least partially, produces an improvement in the performance of incorrect Ss;
3) the fact that half the control Ss progressed during the test shows that, unmarked material being equal, a task composed of four symmetrical elements is easier than one of three elements.

The post-test data showed that the factors of perceptual symmetry between the elements, and the non-random orientation between them and the mark are not sufficient to produce stable changes in Ss' spatial abilities, at least equal to those found in the marked situations.

With respect to the data of the above-mentioned literature, it is confirmed that the greatest cognitive changes in these tasks are obtained when the material, even only symbolically, contains a social hierarchy which, in reality, produces an asymmetrical distribution of space. When this distribution, known to children, conflicts with potential distributions deriving from the application of the Ss' own primitive strategies, the first solution is imposed, leading to resolution of the conflict by means of a cognitively more elaborate strategy.

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FIGURE 1

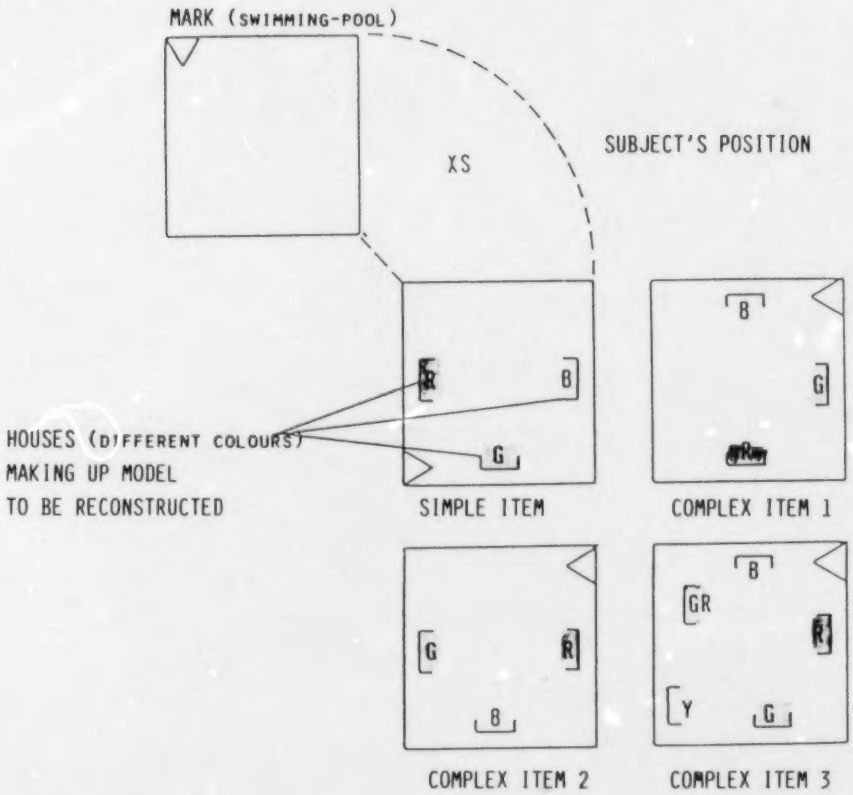

FIGURE 1 THE EXPERIMENTAL SITUATION WITH PRETEST (SIMPLE, COMPLEX 1 AND 2) AND POST-TEST (COMPLEX 3) ITEMS.

FIGURE 2

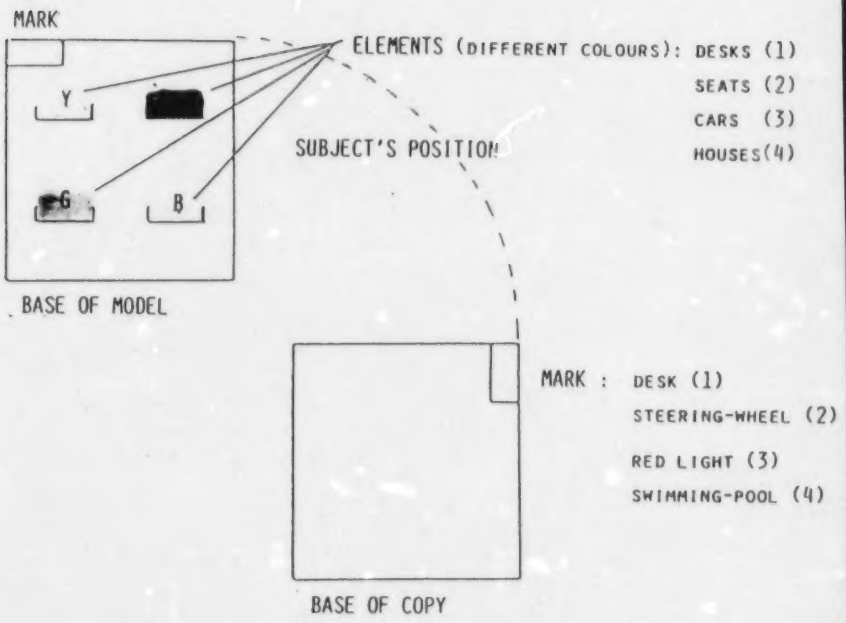

FIGURE 2 PLAN OF THE EXPERIMENTAL SITUATION WITH TEST ITEM

NOTE. THE TEST PHASE INCLUDED 4 ITEMS OF THIS KIND, IN EACH OF WHICH THE MODEL WAS CHANGED ACCORDING TO DIFFERENT COLOUR (Y, G, R, B) ARRANGEMENTS OF ELEMENTS.